DMS-7300

Precast Concrete Fabrication Plants

Effective Date: April 2015

1. DESCRIPTION

This Specification, in conjunction with Item 424, "Precast Concrete Structural Members (Fabrication)," of the Department's *Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges*, governs for fabrication of precast prestressed and precast nonstressed members.

2. UNITS OF MEASUREMENTS

The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

3. DEFINITIONS AND ABBREVIATIONS

The following definitions apply to this Specification.

- **Multi-Project Fabrication Plant—**a facility at an offsite location that fabricates precast prestressed or precast nonstressed members. This definition also applies to single-Contract offsite facilities.
- **Project-Specific Fabrication Plant—**a temporary facility at or near the project location that fabricates precast prestressed or precast nonstressed members for only one Contract. (This definition may be applied to temporary facilities that fabricate for multiple adjacent Contracts, if approved by CST/M&P.)
- **Nonstressed Members—**precast concrete members that have not been pre-tensioned or post-tensioned.
- **Prestressed Members—**precast concrete members fabricated by the process of pre-tensioning, post-tensioning, or a combination of both methods.
- **Minor Prestressed Members—**includes piling (non-voided), bridge deck panels, pavement panels, retaining wall panels, and sound wall panels.
- **Major Prestressed Members—**includes all other prestressed members not listed as minor prestressed members, including but not limited to I-beams, U-beams, box beams, slab beams, cylindrical piling, bent caps, and abutments.
- **I-Beams—**for this Specification, all I-girders and bulb-tee beams are referred to as I-beams.
- **Temperature Probe—**thermocouple for measuring concrete temperature or air temperature.
- **Temperature Recording Device—**data logger for recording temperatures from the temperature probes.
- **PCI—**Precast/Prestressed Concrete Institute.
- **ACI—**American Concrete Institute.
- **NPCA—**National Precast Concrete Association.
- **MOH—**material on hand.
- **Commercial Laboratory Criteria.**
  - Laboratory must be AASHTO-accredited in the specific test(s) to be conducted, and the technician must possess the ACI Aggregate Testing Technician – Level 1 for performing aggregate testing and ACI Concrete Strength Testing Technician for performing Tex-418-A.
  - Technician from commercial laboratory possessing the ACI Aggregate Testing Technician – Level 1 for performing aggregate testing and ACI Concrete Strength Testing Technician for performing

Tex-418-A certification(s) may conduct the required test(s) at the fabrication plant laboratory provided that facility is in compliance with applicable sections of Tex-237-F and Tex-498-A.

4. MATERIAL PRODUCER LIST

The Materials and Pavements Section of the Construction Division (CST/M&P) maintains the Material Producer Lists (MPLs) of fabrication plants that have demonstrated the ability to conform to the requirements of this Specification. When using precast concrete produced by multi-project fabrication plants, it must be listed on the following MPLs in order to be used on Department projects.

- Prestressed Member Fabrication Plants (Multi-Project)
  - Major Prestressed Member Fabrication Plants (Multi-Project)
  - Minor Prestressed Member Fabrication Plants (Multi-Project)
- Nonstressed Member Fabrication Plants (Multi-Project)

Submit all documents referenced in this Specification electronically to CST/M&P. Include date and highlight any changes from previous documents.

5. BIDDERS' AND SUPPLIERS' REQUIREMENTS

The Department will only purchase or allow on projects those products listed by producer and product code or designation shown on the MPL.

Use of pre-qualified product does not relieve the Contractor of the responsibility to provide product that meets this Specification. The Department may inspect or test material at any time and reject any material that does not meet the specifications.

6. QUALIFICATION PROCESS FOR MULTI-PROJECT FABRICATION PLANTS

6.1. **Qualification Request.** Submit a request for plant approval under DMS-7300 to DMS_Prequal@txdot.gov. For plants producing precast concrete structural members, requests must include the following information, in PDF format:

- company and fabrication plant name;
- physical and mailing addresses;
- list of precast concrete products to be evaluated for qualification purposes;
- contact names, titles, phone numbers, and email addresses; and
- additional documents requested throughout this Specification, dependent on plant and product type.

6.2. **Evaluation.** CST/M&P will review the qualification request documentation. If the qualification request includes the required information, CST/M&P will perform an initial Department-directed plant audit in accordance with Article 8, "Plant Approval," to ensure compliance with this Specification. The Department will evaluate all fabrication plants for adequate equipment, processes, organization, experience, knowledge, and competent personnel to produce acceptable work.

6.2.1. **Qualification.** If the required submittals and audit(s) verify compliance with this Specification, the Department will list the fabrication plant on the MPL. CST/M&P reserves the right to perform additional audits (announced or unannounced) at its discretion for the plant to remain on the MPL as an approved fabrication plant for precast concrete structural members.

Fabrication plants must continue successful completion of any additional Department-directed audits and any follow-up plant audits by adequately implementing corrective actions for all deficiencies.

6.2.2. **Failure.** Fabrication plants not qualified under this Specification may not furnish materials for Department projects and must show evidence of correction of all deficiencies before reconsideration for qualification.

6.3. **Random Inspection.** The Department reserves the right to inspect, sample, test, conduct random audits of plants, and perform random audits of required paperwork, test reports, and shipping records at any time to ensure compliance with Item 424, Item 9.6, "Payments for Material on Hand (MOH)", and this Specification. Provide facilities and access to allow for inspection of materials, the process of fabrication, and the finished precast members.

6.4. **Disqualification.** Any fabrication plant that deliberately fails to comply with the requirements of this Specification is subject to disqualification, which includes removal from the MPL. A disqualified fabricator is prohibited from furnishing product to Department projects and may not bid any work let during the disqualification period. The disqualification period will be a minimum of 30 days or as determined by CST/M&P.

Causes for disqualification and removal from the MPL may include, but are not limited to:

- repetitive poor quality and workmanship,
- falsification of or incomplete documentation,
- lack of certified or qualified QC personnel, or
- certifying or furnishing product that does not meet the specifications.

If a fabricator has been disqualified, all previously produced products will be subject to review and possible removal from assigned projects. If the Department disqualifies a fabricator, the Department may permit subcontracting pending product quantities for active projects to another Department-approved fabrication plant for the specific product.

Before issuing a letter removing a fabricator from the MPL, a fabricator may request issue escalation; however, the Department reserves the right to immediately remove from the MPL or suspend acceptance of product from a supplier in order to protect the public and the Department from further harm. Timely corrective action by the fabrication plant suspends MPL removal action and the need for escalation. If needed, the Department will notify Contractors of an impending MPL removal action, through the authority of the Contract.

6.5. **Re-Qualification.** Once the disqualification period established by CST/M&P has elapsed, the fabricator may begin the re-qualification process by providing the Department with an implemented reconciliation plan that includes at a minimum:

- evidence of corrected deficiencies,
- passing an additional Department-directed audit, and
- ensuring compliance with all requirements in this Specification.

The fabricator must bear all Department expenses associated with requalification.

6.6. **Inactive Fabricator.** If a precast fabricator does not furnish any precast concrete product to projects inspected by the Department for a period of 2 years, CST/M&P will remove the fabricator from the MPL due to inactivity.

CST/M&P will consider future qualification when the producer indicates it will furnish precast concrete product to Department projects and is in compliance with this Specification.

7. EQUIPMENT REQUIREMENTS

Field office and inspection laboratory, furnishings, and equipment will be subject to Department approval. As directed, maintain, repair, or replace the building and equipment immediately if either the building or

equipment becomes inadequate for its intended use. Provide building janitorial service acceptable to the Engineer.

7.1. **Field Office and Inspection Laboratory.**

7.1.1. **Multi-Project Fabrication Plant.** Provide a field office and an inspection laboratory before casting any prestressed or nonstressed members required by the Contract. Submit the proposed field office and inspection laboratory floor plan drawings for approval.

Provide a laboratory and office with:

- controlled access with security measures controlled by the Engineer (office only),
- ceilings at least 8 ft. high
- at least 300 sq. ft. of laboratory space,
- at least 200 sq. ft. of office space for plant operations requiring up to two inspection personnel, and
- at least 400 sq. ft. of office space for operations requiring three or more inspection personnel.

If the office and laboratory are in the same building, partition the building to separate them. Building must be weatherproof and adequately lighted, heated, air conditioned, and ventilated.

Furnish the following:

- adequate electrical outlets,
- windows,
- impervious floor covering, and
- rest room facilities, which must include:
  - a flush toilet,
  - a sink with hot and cold running water,
  - a sewer or septic tank with connections, and
  - adequate rest room supplies (paper towels, toilet paper, hand soap, etc.)

Solar screens, blinds, or shades may be required. Furnish potable drinking water acceptable to the Engineer.

Provide broadband internet service via an Internet Service Provider (ISP) capable of accessing the Department's Citrix® Metaframe Server at Austin Headquarters using Department-furnished Citrix® client software.

High-speed broadband connection may be through digital subscriber line (DSL), cable, satellite, fiber-optic (FiOS), or wireless (WISP-hotspot). Provide connections in the quantity needed to provide simultaneous connection of the Contractor and the Inspectors. Connection and download speeds must be commensurate with current industry standards for accessing and downloading large Contract Plans and specifications.

Provide all equipment to connect the desktop or laptop microcomputer to the ISP. Because of problems connecting to the Citrix® Metaframe server, the Department will not permit integrated services digital network (ISDN) service. Validate that the chosen ISP can establish a connection. ISPs that use TCP/IP protocol should be capable of accessing the Citrix® server. Immediately resolve all firewall and technical issues.

Provide adequate ventilation for capping equipment. Locate curing, capping, and testing facilities for concrete cylinders and capping ventilation equipment in a space convenient to the office and laboratory. If housing curing, capping, and testing facilities in the same building as the laboratory, the space required for these facilities will be in addition to the above requirements for laboratory space.

Locate the office and laboratory to provide visibility to plant operations unless otherwise approved. Provide adequate parking space for Department vehicles adjacent to the field office.

Do not house Department and Contractor personnel in the same office. If the Contractor uses a portion of the structure, do not place the field office adjacent to Contractor-used rooms unless otherwise approved. Laboratory space may be shared; however, Contractor access must only be for business purposes, and use of the laboratory and testing equipment must be coordinated with the Department. If the office and laboratory are adjacent to each other, provide a locking, soundproof door between them. The Contractor must enter the laboratory from an alternate door and not through the field office.

7.1.2. **Project-Specific Fabrication Plant.** Provide a field office and inspection laboratory before casting any prestressed or nonstressed members required by the Contract. Provide a Type C structure as specified in Item 504 "Field Office and Laboratory."

7.2. **Furnishings and Laboratory Equipment.** Laboratory must comply with applicable sections of Tex-237-F and Tex-498-A. Calibrate all equipment and house it in a weatherproof enclosure. Recalibrate equipment at the Contractor's expense as follows:

- as required by the manufacturer;
- when suspect results, malfunction, or repair work occurs; or
- as directed by the Engineer.

7.2.1. **Multi-Project Fabrication Plant.** Furnish the following:

- a sink with running hot and cold water;
- worktables, file cabinets, plan file racks, bulletin boards, desks, and chairs as needed;
- a compression machine meeting the requirements of Tex-418-A;
  - The compression machine must be able to test cylinders to their full strength while operating within 90% of full capacity.
  - Nonstressed member fabrication plants may have test cylinders tested by an approved commercial laboratory, at the Contractor's expense, instead of furnishing a compression machine. A licensed professional engineer must seal the test results from a commercial laboratory.
- a video monitoring and digital recording system approved by the Department prior to use for the testing of cylindrical concrete specimens (digital video recorder and monitor to be placed in TxDOT office or laboratory if the Department has full-time access);
- a scale or balance as specified in Tex-401-A;
- equipment as specified in Tex-409-A or ASTM C566 for checking moisture content of aggregates;
- a calcium carbide pressure tester as specified in Tex-425-A;
- equipment as specified in Tex-403-A for determining specific gravity of aggregates;
- a complete set of sieves as specified in Tex-401-A;
- an electrically powered mechanical sieve shaker, to accommodate the sieves furnished above, housed in a soundproof enclosure (Mount the sieve shaker on a rigid platform that extends through the floor and firmly fix it to the ground when a portable structure is used.);
- a thermostatically controlled electric or gas oven capable of maintaining a temperature of 230°F ± 9°F at loaded capacity, or a minimum 1,000-watt microwave oven with interior floor dimensions of at least 14 in. × 14 in.;
- equipment as specified in Tex-447-A for making cylinder test specimens;
- six 10-in. round aggregate pans (microwave safe, if necessary);
- capping equipment meeting the requirements of Tex-450-A or Tex-418-A (unless test cylinders are tested by a commercial laboratory);
- equipment for determining the diameter of test cylinders to the nearest 0.01 in. (unless test cylinders are tested by a commercial laboratory);
- curing tank meeting the requirements of Tex-447-A and large enough to accommodate the required number of test cylinders during production;
- equipment as specified in Tex-404-A and Tex-417-A for determining unit weight;

- equipment as specified in Tex-415-A for determining concrete slump or ASTM C 1611 for determining concrete slump flow, VSI rating, and T-50 test;
- equipment as specified in ASTM C 1610 to determine concrete segregation;
- equipment as specified in ASTM C 232 to determine concrete bleeding;
- equipment as specified in Tex-203-F for performing the sand equivalent test;
- equipment as specified in Tex-422-A for determining temperature of fresh concrete (with thermometers calibrated to at least two points including 50° and 95°F annually or when there is a question of accuracy);
- concrete temperature probes, curing enclosure air temperature probes, and temperature recording devices per Item 424;
  - Provide a minimum of one standby temperature recording device in the plant for emergency use.
  - Temperature recording devices must be able to generate a graph displaying the temperature profile of the entire curing period at intervals not to exceed 15 min.
  - Calibrate temperature recording devices at least once per year, or more frequently, if recommended by the manufacturer. Temperature recording devices must be accurate to within ± 2°F in the range of 0–200°F. The graph generated by the temperature recording device must be readable to within 5°F.
- equipment as specified in Tex-715-I, when match-cure technology is used to cure release-of-tension strength cylinders;
- equipment as specified in Tex-414-A or Tex-416-A for determining air content;
- equipment as specified in Tex-440-A for determining initial set of concrete; and
- equipment to perform inspection duties, including but not limited to:
  - beam length measuring tape,
  - custom squares and straight edges, and
  - measuring jigs.

7.2.2. **Project-Specific Fabrication Plant.** Furnish the following:

- a sink with running hot and cold water;
- a compression machine meeting the requirements of Tex-418-A;
  - The compression machine must be able to test cylinders to their full strength while operating within 90% of full capacity.
  - Nonstressed member fabrication plants may have test cylinders tested by an approved commercial laboratory, at the Contractor's expense, instead of furnishing a compression machine. A licensed professional engineer must seal the test results from a commercial laboratory.
- equipment as specified in Tex-447-A for making cylinder test specimens;
- capping equipment meeting the requirements of Tex-450-A or Tex-418-A (unless test cylinders are tested by a commercial laboratory);
- equipment for determining the diameter of test cylinders to the nearest 0.01 in. (unless test cylinders tested by a commercial laboratory);
- curing tank meeting the requirements of Tex-447-A and large enough to accommodate the required number of test cylinders during production;
- equipment as specified in Tex-415-A for determining concrete slump;
- equipment as specified in Tex-422-A for determining temperature of fresh concrete (with thermometers calibrated to at least two points including 50° and 95°F annually or when there is a question of accuracy);
- concrete temperature probes, curing enclosure air temperature probes, and temperature recording devices per Item 424;
  - Provide a minimum of one standby temperature recording device in the plant for emergency use.
  - Temperature recording devices must be able to generate a graph displaying the temperature profile of the entire curing period at intervals not to exceed 15 min.

- Calibrate temperature recording devices at least once per year, or more frequently, if recommended by the manufacturer. Temperature recording devices must be accurate to within ± 2°F in the range of 0–200°F. The graph generated by the temperature recording device must be readable to within 5°F.

- equipment as specified in Tex-715-I, when match-cure technology is used to cure release-of-tension strength cylinders;
- equipment as specified in Tex-440-A for determining initial set of concrete; and
- equipment to perform inspection duties, including but not limited to:
  - beam length measuring tape,
  - custom squares and straight edges, and
  - measuring jigs.

7.3. **Plant Facilities.** Provide safe access in all prestressed and nonstressed plants around casting lines, batch plants, and the storage area for Department personnel to perform inspection.

7.3.1. **Multi-Project and Project-Specific Prestressed Member Fabrication Plants.** Before casting members, furnish detailed drawings of each stressing line used in prestressed pretensioned concrete fabrication. Provide permanent identification marks, to remain visible at all times when installed, on each load-carrying component to match the stressing line plan details. A licensed professional engineer must seal the plans, specifications, and design calculations for each stressing line. Furnish certification, sealed by a licensed professional engineer, stating that construction of the facilities, including each stressing line, are in accordance with the plans and specifications. Submit the drawings and calculations to the Engineer for approval before beginning work.

On the plans for each stressing line, specify the maximum loading capacity of each permanently identified load-carrying component and the maximum allowable design load and ultimate capacity (load, overturning moment, and uplift force) of each stressing line. Changes to the stressing lines that modify the load-carrying capacity of any component are subject to the same requirements stated above in this section. Provide revised drawings, sealed by a licensed professional engineer, for any changes to the stressing line plans to the Engineer.

Proof-load new and modified stressing lines and, when directed, any existing stressing line, to a minimum 10% overload (10% greater than maximum anticipated working load, overturning moment, and uplift force) for 8 hr. to establish approved working loads. Submit proof-loading procedures, sealed by a licensed professional engineer, 7 days before scheduled proof-loading, that include:

- stressing line designation,
- stressing line hardware configuration,
- load capacity and actual load during proof-loading for each permanently identified load-carrying component,
- strand pattern,
- total load,
- load eccentricity with respect to the same reference point shown on the stressing line plans, and
- certification that the proof-loading procedure does not exceed the maximum allowable design load, overturning moment, or uplift force of the stressing line by more than 10%.

For changes in facilities considered minor by the Engineer, which do not require proof-loading, submit revised drawings sealed by a licensed professional engineer. Submit written certification by a licensed professional engineer or the quality control supervisor (as defined in Article 9, “Personnel Qualifications”) that the modifications were performed in accordance with the revised facility drawings.

When facilities are reassembled, submit written certification by a licensed professional engineer or the quality control supervisor that the reassembly was performed in accordance with approved facility drawings.

Verify that load-carrying components are properly positioned and are adequately supported under load. If damage occurs to the facilities, have qualified personnel review and ensure structural adequacy and safety before subsequent use.

8. PLANT APPROVAL

8.1. **Plant Submittals.** Provide the following submittals to the Engineer for approval for each particular plant operation. Do not begin Department work until the Engineer approves these submittals.

- **Multi-Project Fabrication Plants**—proposed field office and inspection laboratory floor plan drawings per Section 7.1.1., "Multi-Project Fabrication Plant;"
- **Multi-Project Prestressed Member Fabrication Plants and Project-Specific Prestressed Member Fabrication Plants**—stressing line plans, specifications, and design calculations for prestressed pretensioned member production per Section 7.3, "Plant Facilities;"
- **Multi-Project Fabrication Plants and Project-Specific Major Prestressed Member Fabrication Plants**—designated licensed professional engineer (if required), quality control supervisor, and quality control technicians and their required certifications or licenses per Article 9, "Personnel Qualifications;" and
- **Multi-Project Fabrication Plants and Project-Specific Major Prestressed Member Fabrication Plants**—written Production and Quality Control Procedures per Section 10.1.1.1. or Section 10.2.1.1., "Quality Control Procedures," and documentation forms for production processes per Section 10.1.1.5. or Section 10.2.1.5., "Documentation."

8.2. **Plant Audits.** The following applies to both Multi-Project and Project-Specific Major Prestressed Member Fabrication Plants.

8.2.1. **Initial Plant Audits.** Plants must pass an initial Department-directed plant audit. The Department will evaluate fabrication plants for competence of the plant, equipment, organization, experience, knowledge, and personnel to produce acceptable product. This audit will verify plant compliance with this specification in order to be placed on the MPL. Discrepancies identified in the audit must be adequately addressed in a manner acceptable to the Department prior to being placed on the MPL.

8.2.2. **Periodic Plant Audits.** Plants must pass periodic, unannounced, Department-directed plant audits. These additional audits will be performed as determined by the Department for the plant to remain on the MPL as an approved Multi-project Fabrication Plant. Discrepancies identified in the audit must be adequately addressed in a manner acceptable to the Department in order to remain on the MPL.

9. PERSONNEL QUALIFICATIONS

9.1. **Multi-Project Prestressed Member Fabrication Plant.** Provide qualified personnel as follows, unless otherwise approved only on a temporary basis.

9.1.1. **Licensed Professional Engineer.** Have readily available access to the services of a licensed professional engineer experienced in precast prestressed concrete fabrication. This Engineer will be responsible for the design, modification, proof-load procedure development, and review of stressing facilities as stated in Section 7.3., "Plant Facilities," will review potentially structurally deficient members; and will develop flame release sequence procedures as specified in Item 424 when strands are individually detensioned.

9.1.2. **Quality Control Personnel.** Provide an adequate number of qualified personnel to perform the duties listed in Section 10.1.1., "Contractor." QC personnel must be independent of production personnel and proficient in utilizing Department specifications and test methods (if performing or overseeing any concrete or aggregate tests), as determined by the Engineer. QC personnel must have current certifications as follows for the duties listed in Section 10.1.1. Personnel performing these duties are subject to Department approval.

9.1.2.1. **Quality Control Supervisor (On Site).**

- PCI Level III Quality Control Technician (for major prestressed member production),
- PCI Level II Quality Control Technician (for minor prestressed member production),
- ACI Concrete Field Testing Technician – Grade I,
- ACI Aggregate Testing Technician – Level 1, and
- ACI Concrete Strength Testing Technician.

9.1.2.2. **Quality Control Technicians (On Site).**

- PCI Level II Quality Control Technician, for QC personnel performing any tasks listed under Section 10.1.1.3., "Inspection,"
- ACI Concrete Field Testing Technician – Grade I, for QC personnel performing fresh concrete testing per Table 1, (PCI Level II QC technician is required for inspection of concrete batching, placing, consolidating, finishing, and curing),
- ACI Aggregate Testing Technician – Level 1, for QC personnel performing aggregate testing per Table 1, and
- ACI Concrete Strength Testing Technician, for QC personnel performing Tex-418-A.

9.1.3. **Fabricator Safety Point of Contact.** Designate a safety point of contact. Fabricator must adhere to applicable safety regulations and own safety program.

9.2. **Multi-Project Nonstressed Member Fabrication Plant.** Provide qualified personnel as follows, unless otherwise approved only on a temporary basis.

Provide an adequate number of qualified QC personnel to perform the applicable duties listed in Section 10.1.1., "Contractor." QC personnel must be independent of production personnel and proficient in utilizing Department specifications and test methods (if performing or overseeing any concrete or aggregate tests), as determined by the Engineer. QC personnel must have current certifications as follows for the duties listed in Section 10.1.1. Personnel performing these duties are subject to Department approval.

9.2.1. **Quality Control Supervisor (On Site).**

- PCI Level I Quality Control Technician or ACI – Concrete Construction Special Inspector,
- ACI Concrete Field Testing Technician - Grade I,
- ACI Aggregate Testing Technician – Level 1, and
- ACI Concrete Strength Testing Technician.

9.2.2. **Quality Control Technicians (On Site).**

- PCI Level I Quality Control Technician, or ACI Concrete Construction Special Inspector, or NPCA Production and Quality School Level I (recertification required every five years);
- ACI Concrete Field Testing Technician – Grade I, for QC personnel performing fresh concrete testing per Table 1; (PCI Level I QC technician, or ACI Concrete Construction Special Inspector, or NPCA Production and Quality School Level I is required for inspection of concrete batching, placing, consolidating, finishing, and curing);
- ACI Aggregate Testing Technician – Level 1, for QC personnel performing aggregate testing per Table 1; and
- ACI Concrete Strength Testing Technician, for QC personnel performing Tex-418-A.

9.2.3. **Fabricator Safety Point of Contact.** Designate a safety point of contact. Fabricator must adhere to applicable safety regulations and own safety program.

9.3. **Project-Specific Major Prestressed Member Fabrication Plant.** Provide qualified personnel as follows.

9.3.1. **Licensed Professional Engineer.** Have readily available access to the services of a licensed professional engineer experienced in precast prestressed concrete fabrication. This Engineer will be responsible for the design, modification, proof-load procedure development, and review of stressing facilities as stated in Section 7.3., "Plant Facilities"; will review potentially structurally deficient members; and will develop flame release sequence procedures as specified in Item 424 when strands are individually detensioned.

9.3.2. **Quality Control Personnel.** Provide an adequate number of qualified personnel to perform the duties listed in Section 10.2.1., "Contractor." QC personnel must be independent of production personnel and hold current certifications as follows for the duties listed in Section 10.2.1. Personnel performing these duties are subject to Department approval.

9.3.2.1. **Quality Control Supervisor (On Site).**

- PCI Level III Quality Control Technician;
- ACI Concrete Field Testing Technician – Grade I;
- ACI Aggregate Testing Technician – Level 1, for QC personnel performing aggregate testing per Table 1; and
- ACI Concrete Strength Testing Technician, for QC personnel performing Tex-418-A.

9.3.2.2. **Quality Control Technicians (On Site).**

- PCI Level II Quality Control Technician, for QC personnel performing any tasks listed under Section 10.2.1.3., " Inspection";
- ACI Concrete Field Testing Technician – Grade I, for QC personnel performing fresh concrete testing per Table 1 (PCI Level II QC technician is required for inspection of concrete batching, placing, consolidating, finishing, and curing);
- ACI Aggregate Testing Technician – Level 1, for QC personnel performing aggregate testing per Table 1; and
- ACI Concrete Strength Testing Technician, for QC personnel performing Tex-418-A.

9.3.3. **Fabricator Safety Point of Contact.** Designate a safety point of contact. Fabricator must adhere to applicable safety regulations and own safety program.

9.4. **Project-Specific Minor Prestressed Member and Project-Specific Nonstressed Member Fabrication Plants.** Provide qualified personnel as follows, unless otherwise approved only on a temporary basis.

9.4.1. **Licensed Professional Engineer (for Minor Prestressed Member Production).** Have readily available access to the services of a licensed professional engineer experienced in precast prestressed concrete fabrication. This Engineer will be responsible for the design, modification, proof-load procedure development, and review of stressing facilities as stated in Section 7.3., "Plant Facilities"; will review potentially structurally deficient members; and will develop flame release sequence procedures as specified in Item 424 when strands are individually detensioned.

9.4.2. **Quality Control Personnel (On Site).** Provide an adequate number of qualified personnel to perform the duties listed in Section 10.1.1., "Contractor." QC personnel must be independent of production personnel and proficient in utilizing Department specifications and test methods (if performing or overseeing any concrete or aggregate tests), as determined by the Engineer. QC personnel must have current certifications as follows for the duties listed in Section 10.1.1. Personnel performing these duties are subject to Department approval.

- PCI Level II Quality Control Technician (for minor prestressed member production);
- PCI Level I Quality Control Technician, ACI – Concrete Construction Special Inspector, or NPCA Production and Quality School Level I (recertification required every 5 years) (for nonstressed member production);

- ACI Concrete Field Testing Technician – Grade I, for QC personnel performing fresh concrete testing per Table 1;

NOTE: PCI Level II QC technician for minor prestressed member production or the choice of either PCI Level I QC technician, ACI Concrete Construction Special Inspector, or NPCA Production and Quality School Level I for nonstressed member production is required for inspection of concrete batching, placing, consolidating, finishing, and curing.

- ACI Aggregate Testing Technician – Level 1, for QC personnel performing aggregate testing per Table 1; and
- ACI Concrete Strength Testing Technician, for QC personnel performing Tex-418-A.

9.4.3. **Fabricator Safety Point of Contact.** Designate a safety point of contact. Fabricator must adhere to applicable safety regulations and own safety program.

10. QUALITY RESPONSIBILITIES

10.1. **Multi-Project Fabrication Plant.** Quality control is solely the responsibility of the Contractor. The Department will not perform QC for the Contractor.

10.1.1. **Contractor.** Perform, at minimum, the following activities to ensure the quality and acceptability of fabricated products.

10.1.1.1. **Quality Control Procedures.** Submit written production and QC procedures for Department approval that include at least the following:

- work plan for concrete mix designs per Tex-703-I;
- form maintenance and cleaning;
- placement of prestressing strand, reinforcing steel, and embedments;
- weather protection;
- concrete placement and consolidation;
- concrete finishing;
- concrete curing;
- product and applicable component materials handling and storage; and
- finished product inspection and marking of (stamping) approved product.

For prestressed member production, include additional written QC procedures for the following:

- chuck maintenance and cleaning;
- straight and deflected strand stressing;
- partial and full-length strand debonding methods;
- straight and deflected strand detensioning; and
- internal void form hold-down devices and placement measuring methods for voided Box Beams, etc.

Submit updated procedures for approval when requesting changes to the approved procedures, such as QC personnel, products produced, and procedural changes. Include date of revision and highlighted changes for each submittal.

10.1.1.2. **Material Sampling and Testing.** Perform material QC sampling and testing as specified on the Plans and in Table 1. A third party (commercial laboratory, consultant, etc.) may perform material sampling and testing provided the commercial laboratory meets the criteria defined in Article 3, “Definitions and Abbreviations.”

10.1.1.3. **Inspection.** QC personnel will follow approved procedures and verify correct fabrication processes before requesting Department fabrication inspection and will inspect all finished products before requesting Department finished product inspection. QC personnel must ensure, at minimum:

- proper preparation or evaluation of mix designs per Tex-703-I;
- proper form dimensions, condition, cleanliness, and placement;
- strand stressing per approved QC procedures (including written certification);
- proper placement of reinforcing steel, embedments, and strand (including written certification);
- proper placement and measuring methods for Box Beam internal void forms during casting (including written certification);
- proper procedures for batching, mixing, placing, consolidating, finishing, and curing of concrete;
- proper procedures for detensioning (including written certification) and form removal;
- proper procedures for final inspection of product;
- proper procedures for repairs in accordance with the Department's *Concrete Repair Manual*;
- proper procedures for storage of applicable component materials;
- proper procedures for handling, storage, and loading of members; and
- proper procedures for verifying product is marked with approval stamp, is properly identified, and is not damaged or in need of repair at time of shipping.

10.1.1.4. **Certification of Product.** QC personnel must, at minimum, within 14 days of the product cast date:

- track product deficiencies on the Department-supplied spreadsheet, certifying that the repairs and corrective measures were performed and inspected properly by initialing the spreadsheet and placing QC stamp on repair;
- verify product conformance with the shop drawings and all Contract requirements (including written certification);
- mark completed and approved precast concrete products by placing fabricator's monogram stamp including a protective clear coating over the stamp on each member, unless the member is submitted on NCR or has not attained the required design strength. NCRs must be received within 14 days of the cast date. If product on NCR is accepted, repair and mark within 14 days of approval. The monogram stamp must be Department-approved prior to use. Approved fabricator monogram stamps will be listed on the MPL; and
- mark unacceptable precast concrete products with a permanent mark, acceptable to the Engineer, near the product identification marks or remove all project information including county, project number, and CSJ. If the Engineer has approved the marking of product with a fabricator job number instead of the required project information, also remove the fabricator job number.

10.1.1.5. **Documentation.** The Department must receive the following documentation before approving members. Maintain all documentation, available upon Department request. Record and submit information on Department-approved forms as follows:

- aggregate test results submitted immediately after completion of required tests (retention—6 months);
- casting schedule submitted before fabrication that includes, when used, full-length debonding strand patterns for each member;
- printout or manual record of the actual stressing operation (strand load and elongation) with certification that it was performed in accordance with approved QC procedures, submitted immediately after stressing (retention—until final acceptance of project);
- certification that placement of reinforcing steel, embedments, and strand are in conformance with the specifications;
- Box Beam internal void form placement measurements with certification that placement and measuring methods were performed in accordance with approved QC procedures, submitted immediately after casting (retention—until final acceptance of project);
- casting information recorded and available upon request immediately after casting;

- certification that strand detensioning was performed in accordance with approved QC procedures, submitted immediately after strand detensioning;
- certification that repairs were performed in accordance with the Department's *Concrete Repair Manual*;
- certification that finished product conforms with shop drawing and other plan requirements;
- completed Department form PC-2 or PC-7, submitted electronically after product meets all specification requirements (retention—until final acceptance of project); and
- completed Department form PC-2 or PC-7, copy of shop drawing, and concrete mix design worksheet for products allowed to be placed in unassigned stock inventory.

Maintain the following documentation in addition, available upon Department request:

- summary of proof load data (retention—until superseded);
- calibration certifications (retention—until superseded);
- plant laboratory qualification documentation, as required in the applicable sections of Tex-237-F and Tex-498-A (retention—until superseded);
- material test reports (retention—1 year);
- personnel certifications (retention—until superseded);
- cement invoices / material test reports (retention—90 days);
- fresh concrete test results worksheets for required tests (retention—1 year);
- moisture correlation test results for moisture probes (retention—6 months);
- concrete batch plant certification / mixer correspondence (retention—until superseded);
- concrete batch tickets (retention—90 days); and
- Department-supplied product deficiencies spreadsheet and NCRs (retention—7-years).

10.1.2. **Department.** The Department will perform, at minimum, the following activities to ensure the quality and acceptability of fabricated products and will verify acceptable fabrication processes used by the Contractor. The Contractor must provide assistance to Department personnel as needed during sampling and inspection. Inspection or lack of inspection by the Department will not relieve the Contractor from the obligation to provide materials or perform the work in accordance with the Contract.

10.1.2.1. **Quality Control Procedures.** The Department will review for approval the Contractor's written production and QC procedures.

10.1.2.2. **Material Sampling and Testing.** The Department will perform material sampling and testing as needed to verify specification compliance.

10.1.2.3. **Inspection.** The Department will monitor QC performance and perform fabrication and finished product inspection as needed to verify specification compliance.

10.1.2.4. **Documentation.** The Department will verify that the Contractor provides proper documentation.

Table 1
Contractor Minimum Material QC Sampling and Testing Frequencies

Material	Test Method	Frequency
Fine Aggregate	Sieve Analysis[1] Tex-401-A	1 per 2,000 cu. yd. of concrete, minimum 1 per week for each source[2]
	Fineness Modulus[1] Tex-402-A	1 per 2,000 cu. yd. of concrete, minimum 1 per week for each source[2]
	Sand Equivalent[3] Tex-203-F	1 per 2,000 cu. yd. of concrete, minimum 1 per week for each source[2]
	Specific Gravity and Absorption[1 or 9] Tex-403-A	1 per 6 months and when the material source changes
	Unit Weight[1 or 9] Tex-404-A	1 per 6 months and when the material source changes
	Moisture Content[1 or 4] Tex-409-A, Tex-425-A, or ASTM C 566	1 before the first batch of concrete placed each day and when there is an apparent change[5]
Coarse Aggregate	Sieve Analysis[1] Tex-401-A	1 per 2,000 cu. yd. of concrete, minimum 1 per week for each source[2]
	Decantation[1] Tex-406-A	1 per 2,000 cu. yd. of concrete, minimum 1 per week for each source[2]
	Specific Gravity and Absorption[1 or 9] Tex-403-A	1 per 6 months and when the material source changes
	Unit Weight[1 or 9] Tex-404-A	1 per 6 months and when the material source changes
	Moisture Content[1 or 4] Tex-409-A or ASTM C 566	1 before the first batch of concrete placed each day and when there is an apparent change[5]
Conventional Concrete	Slump[6] Tex-415-A	1 for the first batch of concrete placed and 1 for each set of compressive strength cylinders[7]
	Air Content (for air-entrained concrete)[6] Tex-414-A or Tex-416-A	Test in accordance with Item 421
	Temperature[6] Tex-422-A	1 for the first batch of concrete placed and 1 for each set of compressive strength cylinders[7]
	Unit Weight[6] Tex-417-A	1 per month and when a new mix design is established[8]
	Making Test Cylinders[6] Tex-447-A	In accordance with Tex-704-I, and as directed
	Initial Time of Set[6] Tex-440-A	When a new mix design with accelerating admixture is established or accelerated curing will be used, and as directed
	Compressive Strength[1] Tex-418-A	In accordance with Tex-704-I, and as directed
Self-Consolidating Concrete (SCC)	Slump Flow and VSI Rating[6] ASTM C 1611	1 for each of the first 2 batches of concrete placed, 1 for every 5th continuous batch (not delivered load) thereafter, and 1 for each set of compressive strength cylinders[7]
	Air Content (for air-entrained concrete)[6,10] Tex-414-A or Tex-416-A	Test in accordance with Item 421
	Temperature[6] Tex-422-A	1 for the first batch of concrete placed and 1 for each set of compressive strength cylinders[7]

Material	Test Method	Frequency
Self-Consolidating Concrete (SCC) (continued)	Unit Weight[6,10] Tex-417-A	1 per month and when a new mix design is established[8]
	Making Test Cylinders[6,10] Tex-447-A	In accordance with Tex-704-I, and as directed
	Initial Time of Set[6,10] Tex-440-A	When a new mix design with accelerating admixture is established or accelerated curing will be used, and as directed
	Compressive Strength[1] Tex-418-A	In accordance with Tex-704-I, and as directed
	T-50[6] ASTM C 1611	2 per year (summer and winter) and when a new mix design is established
	Passing Ability (J-ring)[6] ASTM C 1621	2 per year (summer and winter) and when a new mix design is established
	Segregation Column[6] ASTM C 1610	2 per year (summer and winter) and when a new mix design is established
	Bleeding[6,10] ASTM C 232	2 per year (summer and winter) and when a new mix design is established
	Modulus of Elasticity ASTM C 469	as directed by the Engineer based on material characteristics

1. QC personnel with current ACI Aggregate Testing Technician – Level 1 certification will perform aggregate test or QC personnel with current ACI Concrete Strength Testing Technician certification will perform concrete compressive strength test.
2. For new aggregate sources and after a failing test for existing sources, increase the testing frequency to 1 per 500 cu. yd. of concrete production, tested prior to use, until obtaining 3 consecutive passing tests. Do not use failed aggregate in the concrete without approval.
3. QC personnel qualified by the Department for this particular test will perform this test.
4. Fabricator personnel qualified by the QC Supervisor for this particular test may perform this test.
5. When aggregate weighing hoppers or storage bins are equipped with properly maintained electric moisture probes for continuous moisture determination, moisture tests are not required daily. Electric moisture probes, however, must be verified weekly against Tex-409-A or ASTM C 566 and be accurate to within 0.3% of the actual free moisture content. Electric moisture probes are required for SCC unless approved by the Engineer. If approved, test moisture content every 4 hours or when there is an apparent change while SCC is being produced.
6. QC personnel with current ACI Concrete Field Testing Technician – Grade I certification will perform the test.
7. For prestressed members, at least 3 total tests per casting line. For nonstressed members, at least 2 total tests per casting lot. If a test fails, test every delivered load until 3 consecutive tests pass. Perform additional tests when directed.
8. When the fresh unit weight of concrete varies from the established value by more than ± 2 lb. per cu. ft., check the air content first to determine if air content has changed from the initial mix design. If the air content is correct, check the aggregate unit weight, gradation, moisture content, and specific gravity. Also, check that the mix proportions have not changed. Verify the fresh unit weight of concrete after making adjustments.
9. Aggregate material supplier may perform the test and provide certified test results.
10. Follow ASTM C 1758 for filling of the test specimens.

10.2. **Project-Specific Major Prestressed Member Fabrication Plant.** Quality control is solely the responsibility of the Contractor, and the Department will not perform QC for the Contractor.

10.2.1. **Contractor.** Perform, at minimum, the following activities to ensure the quality and acceptability of fabricated products.

10.2.1.1. **Quality Control Procedures.** Submit written production and QC procedures for Department approval that include at least the following:

- work plan for concrete mix designs per Tex-703-I;
- form maintenance and cleaning;
- placement of prestressing stand, reinforcing steel, and embedments;

- weather protection;
- concrete placement and consolidation;
- concrete finishing;
- concrete curing;
- product and applicable component materials handling and storage;
- chuck maintenance and cleaning;
- straight and deflected strand stressing;
- partial and full-length strand debonding methods;
- straight and deflected strand detensioning;
- internal void form hold-down devices and placement measuring methods for voided Box Beams, etc.; and
- finished product inspection.

Submit updated procedures for approval when requesting changes to the approved procedures, such as QC personnel, products produced, and procedural changes. Include date of revision and highlighted changes for each submittal.

10.2.1.2. **Material Sampling and Testing.** Perform material QC sampling and testing as specified on the Plans and for the Conventional Concrete tests listed in Table 1. For Contractor job control testing, perform compressive strength testing to verify Handling Strength and Partial Tensioning Strength (release strength) requirements when specified on the Plans.

10.2.1.3. **Inspection.** QC personnel will verify correct fabrication processes before requesting Department fabrication inspection and will inspect all finished products before requesting Department finished product inspection. QC personnel must ensure, at minimum:

- proper preparation or evaluation of mix designs per Tex-703-I;
- proper form dimensions, condition, cleanliness, and placement;
- strand stressing per approved QC procedures (including written certification);;
- proper placement of reinforcing steel, embedments, and strand (including written certification);
- proper placement and measuring methods for Box Beam internal void forms during casting (including written certification);
- proper procedures for batching, mixing, placing, consolidating, finishing, and curing of concrete;
- proper procedures for detensioning (including written certification) and form removal;
- proper procedures for final inspection of product;
- proper procedures for repairs in accordance with the Department's *Concrete Repair Manual*;
- proper procedures for storage of applicable component materials;
- proper procedures for handling, storage, and loading of members; and
- proper procedures for verifying product is marked with approval stamp, is properly identified, and is not damaged or in need of repair at time of shipping.

10.2.1.4. **Certification of Product.** QC personnel must, at minimum, within 14 days of the product cast date:

- track all product deficiencies on the Department-supplied spreadsheet, certifying that the repairs and corrective measures were performed and inspected properly by initialing the spreadsheet and placing QC stamp on repair;
- verify product conformance with the shop drawings and all Contract requirements (including written certification);
- mark completed and approved precast concrete products, in a manner acceptable to the Engineer, unless the member is submitted on NCR or has not attained the required design strength. NCRs must

be received within 14 days of the cast date. If product on NCR is accepted, repair and mark within 14 days of approval; and

- mark unacceptable precast concrete products with a permanent mark, acceptable to the Engineer, near the product identification marks.

10.2.1.5. **Documentation.** The Department must receive the following documentation before approving members. Maintain, at a minimum, the following documentation until final acceptance of the project, available upon Department request. Record and submit this information on Department-approved forms as follows:

- casting schedule submitted before fabrication that includes, when used, full-length debonding strand patterns for each member;
- printout or manual record of the actual stressing operation (strand load and elongation) with certification that it was performed in accordance with approved QC procedures, submitted immediately after stressing;
- certification that placement of reinforcing steel, embedments, and strand are in conformance with the specifications;
- Box Beam internal void form placement measurements with certification that placement and measuring methods were performed in accordance with approved QC procedures, submitted immediately after casting;
- casting information recorded and available upon request immediately after casting;
- certification that strand detensioning was performed in accordance with approved QC procedures, submitted immediately after strand detensioning;
- certification that repairs were performed in accordance with the Department's *Concrete Repair Manual*;
- certification that finished product conforms with shop drawing and other plan requirements; and
- completed Department form PC-2 or PC-7, submitted electronically after product meets all specification requirements.

Maintain the following documentation in addition, available upon Department request:

- summary of proof load data (retention—until superseded);
- calibration certifications (retention—until superseded);
- plant laboratory qualification documentation, as required in the applicable sections of Tex-498-A (retention—until superseded);
- material test reports (retention—1 year);
- personnel certifications (retention—until superseded);
- cement invoices / material test reports (retention—90 days);
- fresh concrete unit weight worksheets (retention—6 months);
- moisture correlation test results for moisture probes (retention—6 months);
- concrete batch plant certification / mixer correspondence (retention—until superseded);
- Concrete batch tickets (retention—90 days); and
- Department-supplied product deficiencies spreadsheet and NCRs (retention—7 years).

10.2.2. **Department.** The Department will perform, at minimum, the following activities to ensure the quality and acceptability of fabricated products and will verify acceptable fabrication processes used by the Contractor. The Contractor must provide assistance to Department personnel as needed during sampling and inspection. Inspection or lack of inspection by the Department will not relieve the Contractor from the obligation to provide materials or perform the work in accordance with the Contract.

10.2.2.1. **Quality Control Procedures.** The Department will review for approval the Contractor's written production and QC procedures.

10.2.2.2. **Material Sampling and Testing.** The Department will perform material sampling and testing as needed to verify specification compliance.

10.2.2.3. **Inspection.** The Department will monitor QC performance and perform fabrication and finished product inspection as needed to verify specification compliance.

10.2.2.4. **Documentation.** The Department will verify that the Contractor provides proper documentation.

10.3. **Project-Specific Minor Prestressed Member and Project-Specific Nonstressed Member Fabrication Plants.** Quality control is solely the responsibility of the Contractor, and the Department will not perform QC for the Contractor.

10.3.1. **Contractor.** Perform, at minimum, the following activities to ensure the quality and acceptability of fabricated products.

10.3.1.1. **Quality Control Procedures.** Submit written production and QC procedures for Department approval that include at least the following:

- work plan for concrete mix designs per Tex-703-I;
- proper procedures for maintaining concrete quality in accordance with Item 424.4.2.4 and Item 424.4.2.5;
- straight strand stressing and detensioning;
- chuck maintenance and cleaning; and
- finished product inspection.

Submit updated procedures for approval when requesting changes to the approved procedures, such as QC personnel, products produced, and procedural changes. Include date of revision and highlighted changes for each submittal.

10.3.1.2. **Material Sampling and Testing.** Perform material QC sampling and testing as specified on the Plans and for the Conventional Concrete tests listed in Table 1. For Contractor job control testing, perform compressive strength testing to verify "Handling Strength" and "Partial Tensioning Strength" (release strength) requirements when specified on the plans.

10.3.1.3. **Inspection.** QC personnel will verify correct fabrication processes before requesting Department fabrication inspection and will inspect all finished products before requesting Department finished product inspection. QC personnel must ensure, at minimum:

- proper preparation or evaluation of mix designs per Tex-703-I;
- proper form dimensions, condition, cleanliness, and placement;
- strand stressing per approved QC procedures (including written certification);
- proper placement of reinforcing steel, embedments, and strand (including written certification);
- proper procedures for batching, mixing, placing, consolidating, finishing, and curing of concrete;
- proper procedures for detensioning (including written certification) and form removal;
- proper procedures for final inspection of product;
- proper procedures for repairs in accordance with the Department's *Concrete Repair Manual*;
- proper procedures for storage of applicable component materials;
- proper procedures for handling, storage, and loading of member; and
- proper procedures for verifying product is marked with approval stamp, is properly identified, and is not damaged or in need of repair at time of shipping.

10.3.1.4. **Certification of Product.** QC personnel, at minimum, must within 14 days of the product cast date:

- track all product deficiencies on the Department-supplied spreadsheet, certifying that the repairs and corrective measures were performed and inspected properly by initialing the spreadsheet and placing QC stamp on repair;
- verify product conformance with the shop drawings and all Contract requirements (including written certification);
- mark completed and approved precast concrete products, in a manner acceptable to the Engineer, unless the member is submitted on NCR or has not attained the required design strength. NCRs must be received within 14 days of the cast date. If product on NCR is accepted, repair and mark within 14 days of approval; and
- mark unacceptable precast concrete products with a permanent mark, acceptable to the Engineer, near the product identification marks.

10.3.1.5. **Documentation.** The Department must receive the following documentation before approving members. Maintain, at a minimum, the following documentation until final acceptance of the project, available upon Department request. Record and submit this information on Department-approved forms as follows:

- printout or manual record of the actual stressing operation (strand load and elongation) with certification that it was performed in accordance with approved QC procedures, submitted immediately after stressing;
- certification that placement of reinforcing steel, embedments, and strand are in conformance with the specifications;
- casting information recorded and available upon request immediately after casting;
- certification that strand detensioning was performed in accordance with approved QC procedures, submitted immediately after strand detensioning;
- certification that repairs were performed in accordance with the Department's *Concrete Repair Manual*;
- certification that finished product conforms with shop drawing and other plan requirements; and
- completed Department form PC-2 or PC-7, submitted electronically after product meets all specification requirements.

Maintain the following documentation in addition, available upon Department request:

- Summary of Proof Load Data (retention—until superseded);
- Calibration certifications (retention—until superseded);
- Material test reports (retention—1 year);
- Personnel certifications (retention—until superseded);
- Cement invoices / material test reports (retention—90 days);
- Moisture correlation test results for moisture probes (retention—6 months);
- Concrete batch tickets (retention—90 days); and
- Department-supplied product deficiencies spreadsheet and NCRs (retention—7 years).

10.3.2. **Department.** The Department will perform, at minimum, the following activities to ensure the quality and acceptability of fabricated products and will verify acceptable fabrication processes used by the Contractor. The Contractor must provide assistance to Department personnel as needed during sampling and inspection. Inspection or lack of inspection by the Department will not relieve the Contractor from the obligation to provide materials or perform the work in accordance with the Contract.

10.3.2.1. **Quality Control Procedures.** The Department will review for approval the Contractor's written production and QC procedures.

10.3.2.2. **Material Sampling and Testing.** The Department will perform material sampling and testing as needed to verify specification compliance.

10.3.2.3. **Inspection.** The Department will monitor QC performance and perform fabrication and finished product inspection as needed to verify specification compliance.

10.3.2.4. **Documentation.** The Department will verify that the Contractor provides proper documentation.

11. ARCHIVED VERSIONS

Archived versions are available.